

Indonesia

Ex-post Monitoring for ODA Loan Project
Jakarta Solid Waste Management System Improvement Project

Evaluator: Ryujiro Sasao (IC Net Limited)

Field Survey: May 2008

1. Outline of the project and Japan's ODA loan



Location of the project



Sunter relay station

1.1 Purpose of the project

The purpose was to improve the waste management system of Jakarta Pusat through introducing vehicles, constructing a relay station and developing a final disposal site, thereby addressing the issue of an ever-increasing volume of waste and eventually contributing to environmental improvements.

1.2 Outline of the loan agreement

Loan Amount /Disbursed Amount	3,836 million yen / 2,757 million yen
Date of Loan Agreement/ Final Disbursement Date	November 1993 August 2000
Ex-post Evaluation	Fiscal 2002
Executing Agency	Directorate General of Human Settlements, Ministry of Public Works
Main Contractors (only a contract for one billion yen or more)	Pt. Bangun Cipta Kontractor (Indonesia)
Consulting Services (only a contract for 100 million yen or more)	Pt. Indah Karya (Indonesia), Pt. Arkonin Engineering Manggala Pratama (Indonesia), Pt. Bumi Pradisi Bi-Epsi (Indonesia), Yachiyo Engineering Co., Ltd.

1.3 Background and reasons for conducting ex-post monitoring study

According to the findings of ex-post evaluation of the project, its relevance was high. Its efficiency, effectiveness and sustainability were moderate. Its overall evaluation was fairly satisfactory. Nonetheless, at the time of ex-post evaluation, issues about effectiveness were pointed out as follows; the volume of waste processed at the Sunter relay station was about one-third of the initial estimate and that the Bekasi final disposal site accepts waste more than its capacity. On the other hand, although the project's impact was confirmed, the findings of the environmental impact assessment/monitoring of the Bekasi final disposal site were unknown due to lack of information from the city of Jakarta. Furthermore, the report pointed out a problem concerning the project's sustainability, that is, insufficient budgets to maintain the facilities and equipment developed under this project. In light of these problems, it was considered that it would be necessary to reexamine the problems and reconfirm the information that was not available. Thus, this project was chosen as a project that requires ex-post monitoring and we carried out our field survey. In this report, we outline the survey, review its results per items, and draw conclusions.

2. Findings of monitoring

2.1 Effectiveness

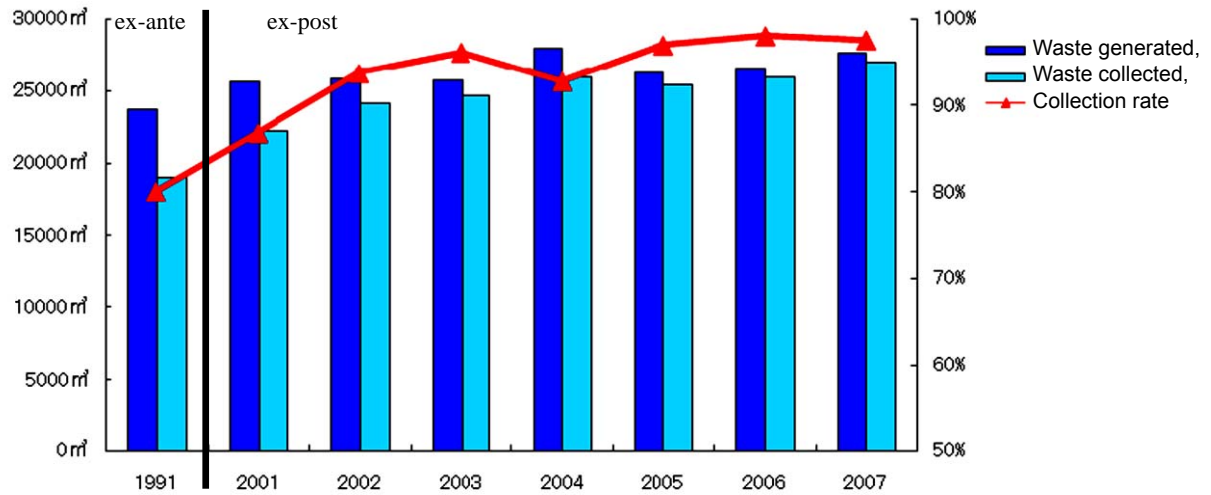
At the time of ex-post evaluation, the waste management system was considerably strengthened by the construction of a relay station and the development of a final disposal site. In addition, subsequent increases in the number of garbage collection vehicles and expansion of the treatment capacity of waste processing facilities have contributed to the volume of waste collected and garbage collection rates in the city of Jakarta. Thus, the project's effectiveness has further increased. Its impact on the living environment can be seen in the fact that the problems of illegal dumping into rivers and an offensive odor have been solved since the time of ex-post evaluation.

(1) Improvement in the waste collection system

As indicated in Figure 1, the total volume of waste generated in the city of Jakarta was 25,600m³ per day at the time of ex-post evaluation (in 2001), out of which 22,196m³ per day, that is, 86.7%, was collected by the City Cleaning Department. In 2007, a volume of 27,654m³ was generated per day, out of which the Cleaning Department collected 26,962m³ per day, which accounted for 97.5%. The factors for contributing to such continuous improvements presumably include the increased number of garbage collection vehicles and the expansion of

processing capacities of the Sunter relay station and Bekasi final disposal site.

Figure 1: Volume generated and collected per day and collection rate



Source: Jakarta City Cleaning Department

(2) Improvement in the road cleaning system

Prior to the implementation of this project, most roads had been manually cleaned. In order to streamline road cleaning, seven mechanical road-cleaning vehicles were procured under this project. Subsequently, the City Cleaning Department purchased 20 more vehicles. As a result, 27 mechanical road-cleaning vehicles are in service. Every day early in the morning, at around time when the collection of waste has been finished, roads are being cleaned. During our field survey, we actually inspected trunk roads to find that they were in clean condition with little garbage.

(3) Construction of the Sunter relay station¹

At the relay station, the garbage brought in from various points of the city is compressed approximately to half and reloaded on containers. The mean number of trips per garbage truck once increased from 1~2 trips a day to 2.98 trips a day. However, the updated figure of 2008 declined to average of 2.0 trips a day. This decline is due likely to aggravating traffic congestions in the city. Nonetheless, a comparison between the present situation and a case in which the Sunter relay station had not been built indicated that transportation expenses (gasoline

¹ The Cakung relay station which was in operation at the time of ex-post evaluation had finished its role as a relay station at the time of this field survey. Currently it carries out the functions of separation, reuse and composting (the process of decomposing kitchen refuse, tree leaves and wastewater sludge with heat of fermentation into fertilizing material).

costs) could be saved extensively because of the relay station.

At the stage of the ex-post evaluation survey in 2001, an average volume of garbage processed at the relay station was 1,660m³ per day. The updated figure indicates an increase to 3,447m³ per day (in 2008). That is, only around volume of 60% out of maximum processing capacity has been processed, however the situation is a great improvement since the time of ex-post evaluation. It is getting close to the upper limit of the actual processing capacity (4,000m³ per day). According to the Jakarta City Cleaning Department, one reason is a larger volume of garbage brought to the relay station by an increased number of garbage trucks and another is the growth of the volume processed per day.²

(4) Bekasi final disposal site

At the Bekasi final disposal site, garbage brought into the site is deposited in the earth with sanitary landfill technology. The volume of waste treated (buried) at the site has been continuously growing. The Bekasi site accepted a volume of 20,154m³ per day on the average in 2001 from Jakarta. In 2007 it reached 26,962m³ per day.³ This is because the volumes of garbage brought from the relay station and waste directly transported from places in Jakarta have been on the increase. Figure 2 (in the following page) shows the volume flow of the process from the generation of waste to their final disposal.

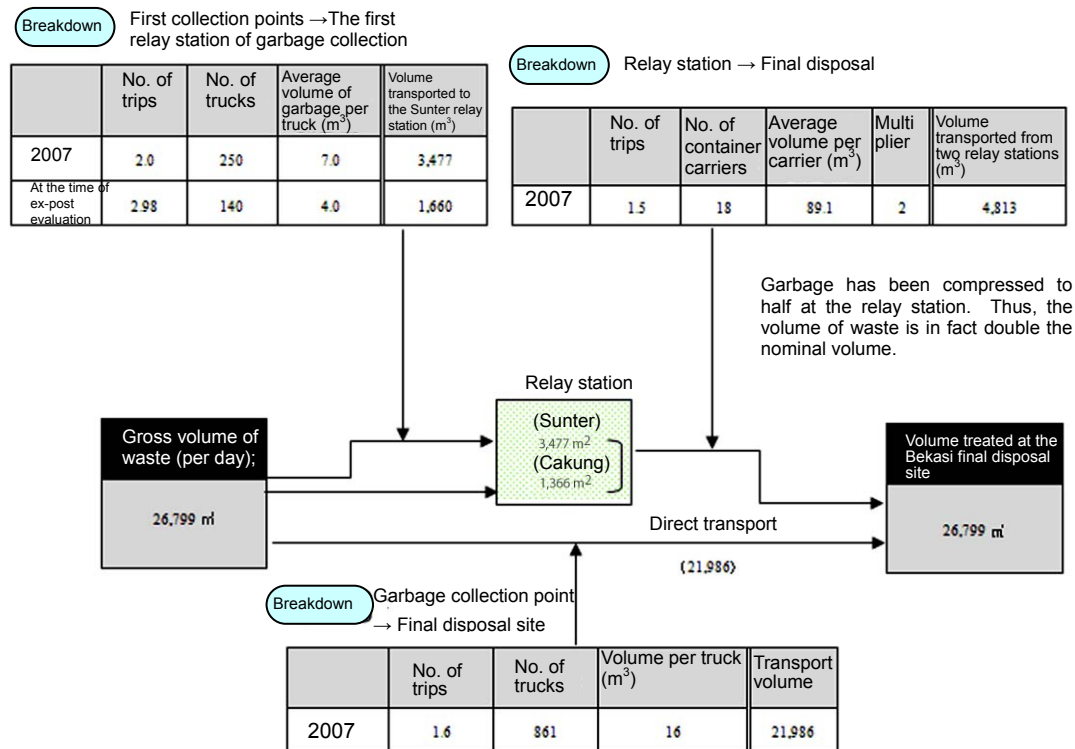
Waste is transported to the disposal site without being separated, thereby drawing scavengers⁴ to settle near the site in order to separate and collect waste. The scavengers make it difficult to do the land-filling operation and earth-covering work. That is, such operations take a longer period. As a result, the earth-covering work cannot be done on the same day when waste is transported, as had been initially planned. In fact, it is carried out at a pace of once a week.⁵ The trucks that transport garbage have to wait for unloading their garbage for several hours, in the worst case. The volume processed per day is coming close to the limit.

² The staff had been working under one-shift system at the time of ex-post evaluation, but a two-shift system was adopted at the time of this survey.

³ It exceeds far beyond the designed processing capacity (14,000m³/day) of the site that was mentioned in the ex-post evaluation report. "Processing" here means the landfill work at the disposal site. Hence, the level of the processing capacity depends upon how the site's service years have been set and changes in the working hours.

⁴ People live near the waste disposal site and support their livelihoods by collecting and selling waste products.

⁵ The work done by scavengers is dangerous. There was an accident costing the life of a person in 2006. This problem has not been solved.



(Source) The above flow chart was prepared based on discussions with the Jakarta Cleaning Department. Some parameters are endorsed by the statistics of the Department, whereas others are based on the estimates given by the Staff of the Department.

Figure 2: Volume analysis of flow of waste treatment

(5) Evaluation by beneficiaries

In order to grasp the change in the garbage collection system after the ex-post evaluation, we followed the survey method taken at the time of ex-post evaluation. That is, we carried out a face-to-face questionnaire survey to 200 persons (including public officials, company workers, self-employed and general residents, etc.) who had been randomly selected from the residents living in the four counties (*kecamatan*) (Tanah Abang, Cempaka Putih, Johar Baru in Jakarta Pusat and Pandemangan in Jakarta Utara) in cooperation with the City Cleaning Department. Its findings are as follows.

- Approximately 50% ~ 80% of residents (62% on the average) consider that the garbage collection system has “improved” since the time of ex-post evaluation, to a varying degree depending on where they live.⁶ The residents who respond that it has “improved” give the reasons of “increased frequency of garbage collection” and “improved accuracy of the date/time of garbage collection.” Such responses endorse higher garbage collection rates

⁶ The respondents were asked to choose one out of “improved,” “no change,” or “worsened.”

indicated in the above Figure 1.

- As to a level of satisfaction with the present garbage collection, 88% of respondents reply “very satisfied,” “satisfied” and “rather satisfied.” The rate is almost the same as the rate at the time of ex-post evaluation.

2.2 Impact

To find out the change in impact on environment since the time of ex-post evaluation, we carried out a beneficiary awareness survey (as a part of the above questionnaire survey). Its findings are outlined in the following table. In general, the living environment has been on an improving trend, excluding “the river water quality in the vicinity.”

Table 1: Impact given by the project per item (since ex-post evaluation)

Item	In percent		
	Improved	No change	Worsened
Illegal dumping	56	33	11
Quality of river water in the neighborhood	28	42	31
Harmful insects	42	39	20
Offensive odor	62	26	13

Source: Questionnaire survey

With respect to impact on the environment adjacent to the facilities constructed or developed under this project, we asked directly some of the residents who had been living in the areas very close to the Sunter relay station since the days before its construction. From the result, we had an impression that there were no problems with noise and vibration and that an offensive odor was within their tolerable range. The findings of the environmental monitoring by the executing agency demonstrate that air and noise are within the tolerable range.

As for the Bekasi final disposal site, there was no problem with smoke that had been reported at the time of ex-post evaluation. However, we talked with the leaders of the three communities adjoining the disposal site. The leader of one community pointed out the following problem and fears and asked for their solutions. That is, they are an offensive odor from the disposal site, the possibility of groundwater contamination caused by waste disposal, and the possibility of rice field contamination caused by water from flooded drains (connected from the site to the fields in the neighborhood) in a heavy rain. We assume that these problems primarily derive from the fact that they are unable to carry out the earth-covering work on the same day when garbage is brought in. At the same time, the neighboring communities got benefits from the construction of the disposal site such as road development, school construction and compensation money.

We passed what we had been told by the communities on to the staff in the City Cleaning

Department. The staff member claimed that the Department had earnestly dealt with each grievance and request so far and that a discussion had been held among the Jakarta City Cleaning Department, the city of Bekasi and residents once a month.

The monitoring report by the executing agency pointed out that a certain level of E. coli has been detected in the groundwater used by residents in the neighborhoods. Thus, we cannot argue that there are not problems at all. Also, we should report that some indicators of treated leachate within the site are beyond the standards set by the national government.

From the standpoint that it is important to heighten awareness of waste problems among residents, the Jakarta City Department has been carrying out a campaign to raise the residents' awareness about waste problems since the time of ex-post evaluation. For instance, the awakening campaign on 3R (Reduce-Reuse-Recycling) was started in many areas of Jakarta including 24 key locations of activities, a list of which was presented. We were given a list showing 24 key points of the activities. The list includes Cempaka Putih, where we carried out the above-stated questionnaire survey, as one of the 24 key points. In our survey, the rate of the respondents who answered that they were "involved in" cleaning activities and recycling activities was particularly high in Cempaka Putih. Thus, we assess that the awakening campaign has been yielding an effect to a certain degree.

In the responses to our beneficiary survey held in the above four counties (*kecamatan*), the ratio of respondents who answered "participated" in cleaning activities rose to 98% from 46% at the time of ex-post evaluation. The ratio of "participation" in recycling activities also increased to 37% from 8%. To the question whether he/she pays the waste collection charge, 90% of the respondents replied yes. Thus, the collection of waste charges has been satisfactory since the time of ex-post evaluation.

We should add the fact that the awakening campaign among residents which is now being held in many areas has not yet grown as a campaign that covers the entire area of Jakarta. Furthermore, the method of garbage separation-collection has not been adopted and garbage is deposited in the earth without being separated. That is, it contains a lot of garbage that can be reused or composted, which places greater burdens on the relay station and the final disposal site.

2.2 Sustainability

There are no problems in particular as to techniques and systems. The financial sustainability, which was pointed out as concern at the time of ex-post evaluation, has been improved because the financial status of the executing agency has been strengthened. The executing agency recognizes the limit of processing capacities of the existing facilities and already has a plan to expand the relay station and enlarge the functions of the final disposal site. The preparation towards its implementation is under way.

2.3.1 Executing agency

2.3.1.1 Operation and maintenance system

The name of the executing agency was changed back to the old name “Directorate General of Human Settlements, Ministry of Public Works” from the “Directorate General of Urban Development, Ministry of Human Settlement and Regional Infrastructure.” However, the organizational structure has not changed since the time of ex-post evaluation. As for administration, each district is responsible for garbage trucks and cleaning vehicles, whereas the Technical Maintenance Department of the Jakarta City Cleaning Department is responsible for the Sunter relay station. On the other hand, the operation and maintenance of Bekasi final disposal site was under the responsibility of the Hazardous Waste Treatment Bureau of the Cleaning Department (at the time of ex-post evaluation). The responsibility now rests with the Technical Maintenance Department. The Jakarta Cleaning Department had a staff of 3,988 persons at the time of ex-post evaluation, but now decreased to 2,728 employees. This decrease is due to the fact that the Department has neither hired new employees nor filled the vacancies created by retirement under the age limit. At the same time, some general works are outsourced to private establishments. The Cleaning Department insists that the current manpower is sufficient to perform its duties, especially when some of its works are outsourced.

2.3.1.2 Techniques in operation and maintenance

At the Sunter relay station the technical staff members who have been working since the time of ex-post evaluation transfer their skills to younger technical staff through OJT. A manual is also kept on hand. Thus, the Department claims that there is no necessity for providing its staff external training. In fact, we observed that the facility/equipment was maintained in good condition without special problems. At the Bekasi final disposal state, a great segment of land-filling has been outsourced. That is, the private sector supports its technical management. It is reported that the disposal site has 28 operators, out of which 20 experienced operators are dispatched by external sources.

2.3.1.3 Finance of operation and maintenance

Due to a better financial status of the city of Jakarta (increased tax revenues because of economic growth) and its greater emphasis on the waste problem, the total budget for the Cleaning Department has been on an upward trend for the past three years. The budget of 2007 was more than twice that of 2001. The maintenance and repair cost also doubled during the same period as well.⁷ Under such circumstances, the Cleaning Department has no concern over the shortage of funds which was pointed out at the time of ex-post evaluation. It is expected that the current size of its budget will be maintained in the future.

2.3.2 Operation and maintenance

More than five years have passed since the implementation of this project. Hence, we were unable to check in detail the maintenance condition of all the equipment procured under this project. However, the machinery/equipment owned by the Cleaning Department is in good maintenance condition. We surmise that there are no special problems as to the machinery/equipment procured under this project as well.

At the Sunter relay station, minor maintenance work is regularly carried out every three months for equipment, and major overhaul is done once a year. The staff of the operation and maintenance division of the relay station performs maintenance work according to the maker's manual.

At the Bekasi final disposal site, all of its machinery/equipment is rented. Thus, the staff does not carry out its maintenance work. Machinery/equipment is kept at a satisfactory level by a private establishment, according to a staff member in the management of the disposal site.

As stated above, there are no problems with the operation and maintenance of facilities. However, the Jakarta City Cleaning Department claims that the processing capacity left for the Bekasi final disposal site is for about 840 days (as of January 2008) if this pace is kept and that it is urgently needed to expand its capacity.⁸

To address this issue, the Jakarta City Cleaning Department has a plan to construct four relay stations in the city in addition to the Sunter relay station which is the only one station in operation now. It is also exploring the possibility of implementing a project to strengthen the waste processing capacity of Bekasi final disposal site, which is the only disposal site for Jakarta. To put it in the concrete, it plans to prolong the operation time of the final disposal

⁷ According to the ordinary budget (per use) of the Jakarta Cleaning Department, the budget for maintenance and repair expenses was approximately 156.4 billion rupiahs in 2001. It increased to about 279.0 billion rupiahs in 2007.

⁸ The ex-post evaluation report pointed out that the issue of whether or not the city of Bekasi accepted garbage posed a political problem between Jakarta and Bekasi. However, as of now, the agreement between Jakarta and Bekasi has been renewed every year. That is, the city of Bekasi keeps its policy to accept garbage.

site by introducing a system in which waste is separated for reuse and composting and by furthering the expansion of the area of the site.

3. Conclusions, lessons learned and recommendations

3.1 Conclusions

Through the efforts of the executing agency such as increasing the number of garbage trucks and improving the maintenance system with a sufficient budgetary measure, the effectiveness of the project has been raised since the time of ex-post evaluation. Its impact has been also expanded. On the other hand, as for the environment of the areas adjoining the facilities, there were no special problems at the Sunter relay station. However, as regards the Bekasi final disposal site, some residents have raised their concern over groundwater contamination and the possibility that wastewater may flow into the rice fields at the time of a heavy rain, which, in all likelihood, are chiefly caused by the fact that the earth covering work cannot be done on the same day when garbage has been transported to the site.

With respect to sustainability, we have detected no problems in terms of the operation and maintenance of facilities, and also the financial weakness has been improved. One critical issue is that the processing capacity of the existing disposal site is coming close to its limit. As a remedial measure to address an increasing volume of waste, the City is planning to expand the facilities of the relay station and the final disposal site and strengthen their capacities.

3.2 Recommendations

“For the Jakarta City Cleaning Department, the executing agency”

- 1) As a measure to deal with an ever-increasing volume of waste, it is important to implement steadily the projects to expand the facilities of relay stations and strengthen the functions of the Bekasi final disposal site (including composting some garbage by separation system) in order to increase the overall capacity of waste management, as has been already planned by the Jakarta City Cleaning Department.
- 2) As for the Bekasi final disposal site, some measures have been taken to alleviate an adverse effect. And yet, there is a sense of dissatisfaction among residents concerning offensive odors and groundwater contamination. The Jakarta City Cleaning Department is requested to continue discussions with the residents, take appropriate measures, and offer full explanations.
- 3) It is recommended that the Cleaning Department will carry out an awakening campaign on the waste separation system, which has already shown an effect in some areas, in a broader area in Jakarta to prevent scavengers from settling near the Bekasi final disposal site and to reduce the waste transport costs.

- 4) It is recommended that various facilities constructed under this project be managed in compliance with the General Waste Management Law enacted in May 2008.

3.3 Lessons learned

“For the Solid Waste Management Department in each city in Indonesia”

As recommended in 3) of 3.2 Recommendations, to prevent scavengers from settling near the final disposal site and reduce waste transport costs, it is desirable to carry out an awakening campaign to citizens about the waste separation system and to build a system to manage waste by adopting the separation system for the entire area, when a waste management project such as this project is implemented.

Comparison between major plans and performance

Item	Plan	Performance
① Project plan		
<u>1 Improvement of waste collection system</u>		
1.1 Procurement of garbage trucks	161 vehicles	193 vehicles
1.2 Procurement of containers	140 vehicles	Same as the left
1.3 Procurement of related equipment	6 vehicles	7 vehicles
<u>2 Improvement of road cleaning system</u>		
2.1 Procurement of road cleaning vehicles	7 vehicles	Same as the left
<u>3 Construction of Sunter relay station</u>	Processing capacity/day: 1,500 tons	Same as the left
<u>4 Construction of sub-workshops</u>		
4.1 Construction of sub-workshop	One place	Same as the left
4.2 Procurement of related equipment	One set	Same as the left
<u>5 Construction of Bekasi final disposal site</u>		
5.1 Improvement of Zone 1 at the site	One zone 12.5 ha	3 zones 7 ha
5.2 Construction of Zone 2 at the site	13 vehicles	11 vehicles
5.3 Procurement of operation vehicles	Non-Japanese: 96M/M Local people: 243M/M	Non-Japanese: 123 M/M Local people: 440 M/M
<u>6 Consulting service</u>		
② Project period		
1 L/A signed	November 1993	Same as the left
2 Consultant Selection	June 1993 ~ May 1994	April 1994 ~ Feb. 1995
3 Consulting services	June 1994 ~ May 1997	March 1995 ~ July 2000
4 Procurement	Jan. 1995 ~ March 1997	July 1996 ~ July 2000
5 Bidding & construction work (out of which, Construction work)	Sept. 1993 ~ May 1997 (April 1995 ~ May 1997)	Dec. 1995 ~ July 2000 (July 1996 ~ July 2000)
③ Project cost		
Foreign currency	890 million yen	1,076 million yen
Local currency	3,655 million yen (Local currency 61,946 million Rp.)	1,904 million yen (Local currency 89,576 million Rp.)
Total	4,545 million yen	2,980 million yen
ODA Loan portion	3,863 million yen	2,757 million yen
Exchange Rate	1Rp.= 0.059 yen (April 1993)	1Rp. = 0.021 yen (Weighted average during the project duration)